

fibres; resembling exactly the embryonic muscular fibres of the frog described by Kölliker. The larvæ in which I observed this belonged to a very peculiar small *Cynthia*, in the Collection of the British Museum. Contrary to the usual course, the larvæ had attained a very considerable degree of development in the space between the inner tunic and the outer wall of the branchial sac, and had so become preserved with their parent.

Another point of great interest about the larvæ may be mentioned here. *The integument of the tail and of the body of young larvæ, in which the body contains nothing but a mass of cells, and offers no trace of any organs or apertures, presents clear and unmistakable signs of the presence of cellulose.* The determination of this point is one of the desiderata left by Löwig and Kölliker (*Annales des Sciences*, 1846), and it shows, I think, very clearly that the Ascidiæ do not necessarily get their cellulose, as they suppose, from the *Diatomaceæ* or other ingesta. Do the cells of the tail of the foetal Ascidian secrete cellulose as the "Primordialschlauch" in plants secretes it? If so, they must fix carbon; and the physiological distinction between animals and plants will disappear, as the anatomical ones have already disappeared.

In referring to the analogies between the *Salpæ* and *Doliolum*, Dr. Krohn appears to uphold the doctrine of the fundamental difference between the *Salpæ* and other Ascidiæ. In the memoirs referred to, I have endeavoured to show, on the contrary, that there is but one type of Ascidian structure, and that the variations upon this type pass insensibly into one another. Subsequent investigations, which I hope to make public at no distant period, have to my mind demonstrated the truth of this proposition. The great difficulty I have found among the Ascidiæ has been, indeed, to discover *any* good anatomical distinctions among the genera.

DESCRIPTION OF PLATE III. B.

Fig. 1. *Doliolum Mülleri*, asexual individual, from the ventral side: *a*, gemmiferous tube or "gemmarium;" *b*, penultimate muscular band with its ends inserted into the gemmarium.

Fig. 2. Larva of *D. Nordmanni*: *c*, larval tegument; *d*, young *Doliolum*; *e*, vesicular appendage; *f*, axis of the tail.

Fig. 3. The same further developed and more magnified. Letters as before.

XIV.—On the genus *Lepton*. By WILLIAM CLARK, Esq.

To the Editors of the *Annals of Natural History*.

GENTLEMEN,

Exmouth, July 5, 1852.

I HAVE stated in the July 'Annals' for 1852, that the discovery of the animal of the *Lepton convexum* has put it in my power to

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settle the disputed identity or distinctness between it and *L. nitidum*, and that after due examination I would communicate the result. I redeem my pledge by presenting a short memoir on the genus *Lepton*. Though the *L. squamosum*, the type, has been mentioned by authors, I have thought that it would be desirable to give my account of the animal, with some additions and a few observations on the natural position of the genus.

LEPTON, Turton.

Lepton squamosum, auct.

Solen squamosus, Mont.

Animal inhabiting a very flat, subrhomboidal, white, porcelainous, punctured shell; its ground colour is a clear white: the mantle is very large, having the margins sinuated, often puckered into two or three folds at the will of the animal; they extend beyond the shell more than one-third of the vertical measure at its centre, from which spring a row, on each side the middle of the ventral range, of twenty-five rather long, slender, milk-white tentacular pointed filaments; but the mantle thus clothed is only protruded largely beyond the shell, from the middle of the anterior side, throughout the ventral range, to the same level at the posterior end; from these points to the umbones it is never seen, being either closed or not protruded, but its suture or edges are furnished with about forty long, strong, blunt, frosted white, rather close-set cirrhi varying in length; a part of these range at the posterior side of the beaks, above the sessile anal orifice, which occupies a small space without cirrhi, between the termination of the protrusion of the margin and the commencement of the larger filaments on the broader, larger, and posterior side; of that part of the filaments at the anterior side of the beaks, one is thicker, broader at the base, and double the length of the others; this is the last of the larger ones, which at one time I thought was tubular and might be an oviduct, but further examination seemed to disprove this idea. None of the filaments show much motion; the long one only, when the animal advanced a step, made an arcuated contraction, similar to that of the fore-finger *in extenso* when quickly brought down to the palm of the hand; it then resumed the straight position to await another step: all the other cirrhi are either retractile or contractile, separately or *en masse*.

The foot is hyaline azure, with a broad longitudinal medial line of intense snow-white, and a still intenser flake at the anterior end; it is fixed to the centre of the body by a moderately long pedicle; on first protrusion it takes a vertical position, and

has a linguiform tapering aspect, but this part almost immediately, after feeling about, ranges itself anteriorly and horizontally; and at the same time, on the other side of the pedicle, a bevelled, attenuated, pointed portion issues, somewhat shorter than the first; this is longitudinally cloven as far as the pedicle, and can form a sort of oval disk, but on the march it is rarely expanded: at the base of the cleft is the byssal gland, which occasionally pours out a glutinous red filamentous matter, that in confinement is copious, and discharged anteriorly, which at first I thought was faecal matters, and was puzzled to account for such an issue antea, but the subsequent view of the single sessile postanal conduit and the ejection of pellets cleared up the difficulty. This foot is in every respect similar in miniature to that of the *Pectunculus pilosus* and of the *Arcadae*.

The animal is vivacious, and allowed itself to be examined many times daily; it marched with quickness, but I only once saw it progressing in a vertical position; the usual posture of the shell is to rest on one of the disks, which is frequently changed for the other; the adductors did not appear to allow of a greater opening of the valves than the ordinary extent. The animal, when placed at the bottom of a glass, always crawled up and moored itself by a filament at the side; sometimes, however, it slipped its moorings and floated free on the surface of the water with the umbones downwards, and after an interval refixed itself by spinning a byssal thread.

I cannot speak at present of the branchiæ and palpi, as the animal and shell are in my collection, and are thus preserved to show that the shell, though usually described by conchologists as gaping, can, in consequence of the flexibility of the thin laminar valves, be completely closed. There is no branchial siphon; but there are mantellar folds, which, with the great ventral opening, amply provide for the admission of the water.

The animals of this interesting group exhibit, in the tentacular filaments and curious foot, as well as in the sculpture of their shells, very considerable variation from *Kellia rubra* and *Kellia suborbicularis*; the types of one of the genera of the family in which they have been located by authors, doubtless from the want of knowledge of the animal. Taking into consideration that the *Leptons* have many of the attributes of the *Arcadae*, and especially giving due weight to the remarkable similarity between the foot of *Lepton squamosum* and the *Pectunculus pilosus*, I am almost induced to believe that it is in a false position, in connection with the *Kelliadae*, and that it ought to follow or precede *Galeomma*, which, with me, is an undoubted genus of the *Arcadae*.

The punctures of this species and of *L. convexum* are in the

test; with respect to its congener, the *L. nitidum*, it has been stated that it is smooth and without punctures: this is a mistake, as I can show fifty specimens not only well-marked on the greenish epidermis, but in the substance of the shell.

I have the satisfaction to state, that I have observed another live *L. squamosum*, and also obtained full notes of the animal of one of our great desiderata, the *L. nitidum*, from a most lively animal, which for several days gave me every facility for examination. The *L. squamosum*, just alluded to, was kept thirty-four days in a glass of sea-water, changed daily, and was apparently as vigorous as when first placed in captivity; it thus appears that the Conchiferæ can exist for a long time in pure sea-water, on the animalculæ it contains, though that aliment may not be their sole resource in freedom.

I may observe, that the habitude of crawling and swimming with the foot uppermost in *Lepton*, and in several other minute bivalves, perhaps in all, shows the close alliance of the Acephala with the Gasteropoda, all of which, in their minute condition, have precisely the same peculiar system of dorsal natation. I ought to have mentioned that the liver is light green and mixed up with a flake-white ovary; but from the extreme tenderness of the branchiæ, I cannot speak of them and the palpi with certainty as to form and number.

July 2nd.—As I had just finished the above, a lively specimen of this species was met with, which, on being placed in water, at once unfurled its long and beautiful fringes, and exerted the ample niveous mantle and foot. This is certainly the Prince of British bivalves; the snow-white colour of both animal and shell sheds over this interesting creature the inexpressible charms of purity and elegance. It now lives in the same vase with its pigmy congener, the *L. convexum*.

Lepton nitidum, Turton et auct.

The animal inhabits a light greenish yellow or pure white, subrhomboidal, moderately convex, more or less punctured shell. The mantle is frosted white with the margins plain, but as much proportionately protruded beyond the edge of the shell as in *L. squamosum*; it is in like manner clothed with cirrhal filaments of about the same length, and of pruinose white, but unlike that species, they are rather less developed dorsally than ventrally; each filament at its terminal edge is studded with four or five white points or cilia, so sharp and minute as to require a powerful lens to see them. There is no conspicuous leading process, as in the preceding species, but the mantle, at the same anterior point, forms a visible projection or fold. In this spe-

cies, and contrary to *L. squamosum*, the longer and broader end is anterior, but the beaks are so central, that there is little difference in the sides; the single sessile anal tube is exactly as in the last species; there is no branchial siphon,—the water enters at the extensive ventral aperture. The foot is almost in every respect similar to that of its congener; it is perhaps larger in proportion, of pale azure hue, marked with intense but irregular flake-white minute blotches; the posterior extremity is as long as the portion anterior to the pedicle; its termination is perfectly aciculate, and like its congener deeply grooved as far as the junction with the body, at which point is the byssal gland, and the superabundant filamentous matter is similarly discharged.

The *L. squamosum* is a lively creature, but this, not one-third of the size, is far more active, creeping up a glass as easily as a Gasteropod; but the posterior portion of the foot is not expanded; perhaps in freedom it is deployed on the march; in confinement both shell and foot are carried laterally. The liver is light green, united to a flake-white ovarium, now, in June, full of ova. Transverse length $\frac{1}{8}$, vertical $\frac{1}{12}$, diameter $\frac{1}{15}$ of an inch. It would appear that this species in every essential is identical with the *L. squamosum*, and it settles the position of the yet undiscovered *L. convexum*. This is the first record of this rare animal that has appeared.

Exmouth, June 20, 1852.

I have this day the pleasure to state, that the problem is solved as to the identity or distinctness of the *Lepton nitidum* and *L. convexum* by the capture of a live specimen of the latter, having the shell sculptured with the rough and intensely marked characteristic punctures of that species. On putting the animal into water it instantly deployed its organs; and for their description I have only to refer to the preceding account of the *L. nitidum*, which in future will take the appellation of a variety of its old associate. The two are so identical, that after ten days' examination I can make no alteration in the minutes, except the having seen the animal march on the disk of the foot, more than once, with the shell in a vertical position; it has all the same habitudes as the *L. squamosum*, and of course differs in no respect from its smoother variety, the late *L. nitidum*. It is now alive, and probably by changing the water daily it will live as long or longer than the *L. squamosum* mentioned above. It is therefore evident that the punctures of this species are very variable, ranging from the most minute granules that scarcely interrupt its smoothness to the coarsest sculpture.

As the specific appellation of *nitidum* is obviously improper, the more significant one of *convexum* ought now to be adopted.

Exmouth, July 18.

Since the above was written I have taken two examples, one this morning, of the smoothest variety of the '*convexum*,' late the '*nitidum*'; both are in the vase with the highly punctured one captured 20th June last, now quite vigorous, in company with the *L. squamosum* alluded to as taken 2nd July; this capture has given me the advantage of a live examination of the two completely opposite conditions of the '*convexum*,' whereas the one above was only referable in comparison with an account of a live '*nitidum*' taken last year. And I can again state that the two varieties are identical.

Lepton Clarkia (nova species).

Annals Nat. Hist. New Series, vol. ix. pp. 191 & 293.

The above references give every particular of the shell of this new species, of which it is probable I may detect the animal; but the hinge is so completely identical with that of the *L. convexum*, that it may be presumed its organs will not greatly differ from it.

I am, Gentlemen, your most obedient servant,

WILLIAM CLARK.

BIBLIOGRAPHICAL NOTICES.

A History of Infusorial Animalcules, Living and Fossil.

By ANDREW PRITCHARD, M.R.I. 8vo, pp. 704. Whittaker & Co.

A NEW edition of the only English version of the laborious investigations which have made Prof. Ehrenberg's name famous among micro-naturalists (if we may for the nonce coin a word as good as micro-mammalogists), must be looked upon as a praiseworthy and creditable undertaking.

So far as mere facts are concerned, so many have accumulated during the fourteen years that have elapsed since the publication of the great work, to which we have been indebted for the first impulse to investigation, and for the first guidance in the confused and difficult task, that the gathering them into one place, and making them all accessible to the English reader, is a service of no small merit.

Again, however much Prof. Ehrenberg may condemn them as heretical, it is indubitable that a large body of Fathers of greater or less authority have added their writings to his Canon. Indeed, they have not unfrequently ventured to impugn and protest against the statements of the head of the church microscopical himself.

Mr. Pritchard has with a laudable eclecticism gathered *all* these, wheat and tares, poppy and clover, into one sheaf (a very considerable sheaf too); but thrashing and winnowing is evidently in his view